E.O. Lawrence Berkeley National Laboratory
University of California
Environmental Restoration Program

United States Department of Energy

REQUEST FOR NO FURTHER ACTION (NFA) STATUS FOR Building 70A Sanitary Sewer (Area of Concern 8-7)

for the

Lawrence Berkeley National Laboratory

ENVIRONMENTAL RESTORATION PROGRAM

September 1999

REQUEST FOR
NO FURTHER ACTION (NFA) STATUS
FOR
Building 70A Sanitary Sewer
(Area of Concern 8-7)

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Lawrence Berkeley National Laboratory

ENVIRONMENTAL RESTORATION PROGRAM

A Joint Effort of
Environment, Health and Safety Division and
Earth Sciences Division
Lawrence Berkeley National Laboratory
University of California
Berkeley, CA 94720

September 1999

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SECTION 1

INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this report is to request approval of No Further Action (NFA) status for Building 70A Sanitary Sewer (Area of Concern [AOC] 8-7), under the Resource Conservation and Recovery Act (RCRA) Corrective Action Program (CAP) at Lawrence Berkeley National Laboratory (Berkeley Lab). The California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) is the lead regulatory agency for the CAP and has the authority to approve NFA status for this unit. If NFA status is approved, no additional sampling would be required and the unit will not be included in the site-wide risk assessment. The location of AOC 8-7 is shown on Figure 1.

Berkeley Lab initially included AOC 8-7 in a report that was submitted to DTSC in January 1999, requesting NFA or No Further Investigation (NFI) status for two Solid Waste Management Units (SWMUs) and four AOCs at Berkeley Lab (Berkeley Lab, 1999). In April 1999, DTSC responded with a Notice of Deficiency to Berkeley Lab's NFA/NFI request (DTSC, 1999). DTSC's comments on AOC 8-7 were as follows:

1. Provide diagrams with dimensions showing exact locations of samples taken with respect to suspect pipe and groundwater gradient.

2. Chemicals of potential concern listed do not correspond to all wastes generated by laboratories in Building 70A (semi conductor manufacturing) which should also include metals and cyanide.

Berkeley Lab submitted comments to DTSC's Notice of Deficiency on May 28, 1999. Berkeley Lab's responses to DTSC's comments on AOC 8-7 are attached (Attachment 1). Diagrams with dimensions showing exact locations of samples taken with respect to the sanitary sewer line and groundwater gradient are included on Figure 1 and Figure 2.

1.2 SITE DESCRIPTION AND HISTORY

The Building 70A sanitary sewer emanates from the west side of Building 70A. Potential contributors to the sewer influent have been facilities in Building 70A, including the new and inactive waste neutralization units (SWMU 8-2). Before the installation of these neutralization units, wastewater was discharged untreated to the sanitary sewer. The location of the Building 70A sanitary sewer and soil and soil-gas sampling locations are shown on Figure 1.

1.3 CONSTITUENTS OF POTENTIAL CONCERN (COPCs)

The COPCs are halogenated VOCs, acid wastes, metals, and radioactive constituents.

1.4 GEOLOGY AND HYDROGEOLOGY

The geology consists of Great Valley Group shale that extends from beneath the asphalt base rock at the surface to a depth of 50 feet. Below the shale are interlayered siltstones, fine-grained sandstones, and shales also of the Great Valley Group. The approximate groundwater gradient is illustrated on Figure 1. Depth to groundwater was measured at 122 feet in MW70A-96-14 during the third quarter of FY99. Based on results of slug tests conducted in monitoring wells, the Great Valley Group at Berkeley Lab has a hydraulic conductivity of 10^{-5} to 10^{-7} m/s.

1.5 SCREENING PROCESS FOR NO FURTHER ACTION (NFA) OR NO FURTHER INVESTIGATION (NFI) STATUS

After sampling has been completed to assess whether a release has occurred at a SWMU or AOC, and the magnitude and extent of any contamination have been evaluated, the unit is screened in accordance with the DTSC approved procedure described in the following paragraphs. The purpose of the screening is to determine whether the unit should be recommended for either NFA or NFI status. The first step is to compare the detected concentrations of analytes to Berkeley Lab background levels. The second step is to compare concentrations above background levels to United States Environmental Protection Agency (USEPA) Region IX Preliminary Remediation Goals (PRGs) for residential soil (USEPA, 1998).

Soil analytical data are compared to background levels to determine if contamination is present. For compounds that are not naturally occurring, such as most organic compounds, any detection is assumed to be contamination, unless another source, such as laboratory contamination of the sample, can be verified. For naturally occurring analytes such as metals, detected concentrations are compared to statistically-derived background levels to identify, with a certain degree of confidence, which constituents are present at concentrations that represent contamination. Berkeley Lab has used the 95% upper tolerance limit method (USEPA, 1989) to estimate background concentrations of metals in soil (Berkeley Lab, 1995).

Concentrations of analytes detected above background levels are then compared to USEPA Region IX PRGs (USEPA, 1998) or Cal-Modified PRGs for residential soil, where Region IX PRGs either have not been established, or are greater than the Cal-modified values. To implement a conservative approach to site screening, Berkeley Lab uses PRGs established for residential soils instead of less-stringent PRGs for soil at industrial sites.

Where concentrations of contaminants in soil are within Berkeley Lab background levels or below PRGs for residential soil, the SWMU or AOC is recommended for NFA status. Where concentrations of contaminants in soil are above both Berkeley Lab background levels and PRGs for residential soil, the SWMU or AOC is recommended for NFI status. No further site characterization will be required by DTSC for SWMUs and AOCs approved for either NFA or NFI status. SWMUs and AOCs approved for NFI status will be included in the risk assessment to be conducted as part of the Corrective Measures Studies (CMS) phase of the RCRA CAP. SWMUs and AOCs that are approved for NFA status will not be included in the CMS.

SECTION 2

SEWER LINE INVESTIGATIONS

2.1 INTRODUCTION

The following approach was followed to investigate whether a release had occurred from the Building 70A Sanitary Sewer. The approach is consistent with Berkeley Lab's response to DTSC's comments (Attachment 1) and discussions held with the DTSC and the City of Berkeley at Berkeley Lab on July 1, 1999.

1. Conduct a video survey of sewer line to identify dislocations, breaks or perforations caused by corrosion.

2. If dislocations, breaks, or perforations are identified by the survey, additional sampling will be conducted. If no dislocations, breaks, or perforations are identified the unit would be submitted for NFA status.

2.2 RESULTS OF VIDEO SURVEY AND RECENT SOIL SAMPLING

On September 15, 1999, Berkeley Lab conducted a video survey of the Building 70A Sanitary Sewer. The details of the survey and results are attached in a memorandum (Attachment 2). The only compromise to the integrity of the pipe identified by the survey was a root intrusion at a joint approximately 160 feet downflow from Building 70A. A test pit was dug at the location of the root intrusion to allow the collection of soil samples from beneath the pipe. The location of the test pit is shown on Figure 1. Photographs of the position of the test pit relative to Building 70A and the location of root intrusion at the top of the sanitary sewer line are included in Attachment 3. No leakage from the sewer line was observed in the test pit.

Soil samples were collected at two locations in the pit immediately beneath the sewer line. Samples at both locations were analyzed for volatile organic compounds (VOCs) (EPA Method 8260); metals; pH; and gross alpha, gross beta, and gamma radiation. Analytical results are included in Table 1 (VOCs and pH), Table 2 (metals), and Table 3 (radionuclides). The pH measured was neutral (7.5 and 7.6). Concentrations of metals detected were within Berkeley

Lab background levels. No VOCs were detected. Gross alpha radiation was not detected. Gross beta radiation was reported as consistent with the amount of naturally occurring potassium 40 and products of decay of naturally occurring radionuclides found in the sample. Gamma radiation was reported as naturally occurring radionuclides. Based on the results of the video survey and the soil sampling there is no indication that a chemical release has occurred from the sewer line.

SECTION 3

SUPPLEMENTAL ENVIRONMENTAL INVESTIGATIONS

3.1 SUMMARY OF INVESTIGATIONS

Soil, groundwater, and soil-gas sampling locations related to the Building 70A Sanitary Sewer are shown on Figure 1. In 1995, ten shallow soil-gas probes were installed along the Building 70A Sanitary Sewer line. Soil-gas samples collected from each of the probes were analyzed for fuels and VOCs. Based on the results of soil-gas sample analysis, shallow soil samples were collected in October 1996 at five locations along the sewer line (SB70A-96-1, -2, -3, -4, and -5 on Figure 1), at approximately 1 to 3 feet below the invert elevation of the sewer line (5 to 7 feet bgs) (Figure 2). Soil samples were analyzed for VOCs, metals, pH, and gross alpha, gross beta, and gamma radiation.

Two groundwater monitoring wells (MW70A-96-13 and MW70A-96-14) were installed west of Building 70A in 1996, downgradient from the Building 70A Sanitary Sewer (Figure 1). Soil samples from the well borings were analyzed for VOCs and metals.

3.2 RESULTS

Analytical results are included in Table 1 (VOCs and pH), Table 2 (metals), and Table 3 (radionuclides). Concentrations of VOCs detected, levels of pH, and concentrations of metals detected above background levels are shown on Figure 2 (cross section along the sewer line and plan view of the test pit).

Soil-Gas

Traces (38 to 206 ppbv total) of VOCs were detected in all soil-gas samples. The maximum concentrations detected were 120 ppbv perchloroethylene (PCE), 86 ppbv 1,1,1-trichloroethane (TCA), 13 ppbv trichloroethylene (TCE), 21 ppbv m,p-xylenes, 6.8 ppbv o-xylene, 25 ppbv 1,2,4-trimethylbenzene, and 6.5 ppbv 1,3,5-trimethylbenzene. TPH-G was detected at concentrations of 94 ppbv to 450 ppbv.

Soil

No VOCs were detected. Levels of pH, measured in soil were neutral (7.4 to 7.7). Cobalt, copper, mercury, and zinc were detected at concentrations above Berkeley Lab site background levels. The copper and mercury were within the background levels of the Great Valley Group. Only one zinc and one cobalt sample were above the background levels of the Great Valley Group, the geologic unit where the samples were collected; however, these samples were only approximately 2% to 4% above the background level. None of these metals were detected at concentrations above the PRGs for residential soil. Gross alpha radiation was not detected and gross gamma radiation (27 ±13 to 36 ±15 pCi/g) was reported as naturally occurring potassium-40 (^{40}K). Gross beta radiation detections ranged from 14 ±2 to 23 ±2 pCi/g.

Groundwater

No VOCs have been detected in groundwater samples collected from MW70A-96-13 or MW70A-96-14 in quarterly groundwater sampling since January 1997.

SECTION 4

RATIONALE FOR NFA RECOMMENDATION

NFA status is recommended for the Building 70A Sanitary Sewer (AOC 8-7). Berkeley Lab followed the methodology specified in Berkeley Lab's response to DTSC's comments (Attachment 1) and discussions held with the DTSC and the City of Berkeley at Berkeley Lab on July 1, 1999 to investigate whether a release had occurred from the Building 70A Sanitary Sewer.

1 Conduct a video survey of sewer line to identify dislocations, breaks or perforations caused by corrosion.

2 If dislocations, breaks, or perforations, are identified by the survey, additional sampling would be conducted.

Based on the results of the video survey and the associated soil sampling there is no indication that a chemical release has occurred from the sewer line. The video survey indicated only one location where the integrity of the pipe was compromised. Soil samples were collected from soil immediately beneath the pipe at the location of the root intrusion that was identified, to evaluate whether a chemical release had occurred. No VOCs were detected. Metals were within background levels and pH was neutral.

Supplemental information to support the NFA request includes the following:

- The sanitary sewer line at the location of the root intrusion was repaired on September 25, 1999.
- No groundwater contamination has been detected in the two groundwater monitoring wells downgradient from the sanitary sewer line.
- No VOCs were detected in soil samples collected from the 1996 borings drilled adjacent to, and sampled beneath, the invert elevation of the sanitary sewer line. Levels of pH, measured in the soil were neutral. Cobalt, copper, mercury, and zinc were detected at concentrations above Berkeley Lab site background levels (but below PRGs for residential soil). The copper and mercury were within the background levels of the Great Valley Group, the geologic unit where the samples were collected. Only one zinc and one cobalt sample were above the background

levels of the Great Valley Group; however, these samples were only approximately 2% to 4% above the statistically determined Great Valley Group background level.

SECTION 5

REFERENCES

DTSC, 1999. *Notice of Deficiency* for NFA Status Request for SWMUs 3-6 and 9-6 and AOCs 8-7, 9-8, 10-3, Lawrence Berkeley National Laboratory, Berkeley, CA, EPA ID no. CA4890 008 986, April 30, 1999.

Berkeley Lab, 1995. *Protocol for Determining Background Concentrations of Metals in Soil at Lawrence Berkeley National Laboratory (Berkeley Lab).* Environmental Restoration Program, Lawrence Berkeley National Laboratory. August 1995.

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USEPA, 1989. *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities.* Interim Final Guidance, United States Environmental Protection Agency. Publication number PB89-151047. February 1989.

USEPA, 1998. *Region 9 Preliminary Remediation Goals (PRGs) 1998.* USEPA Region IX.

LIST OF FIGURES

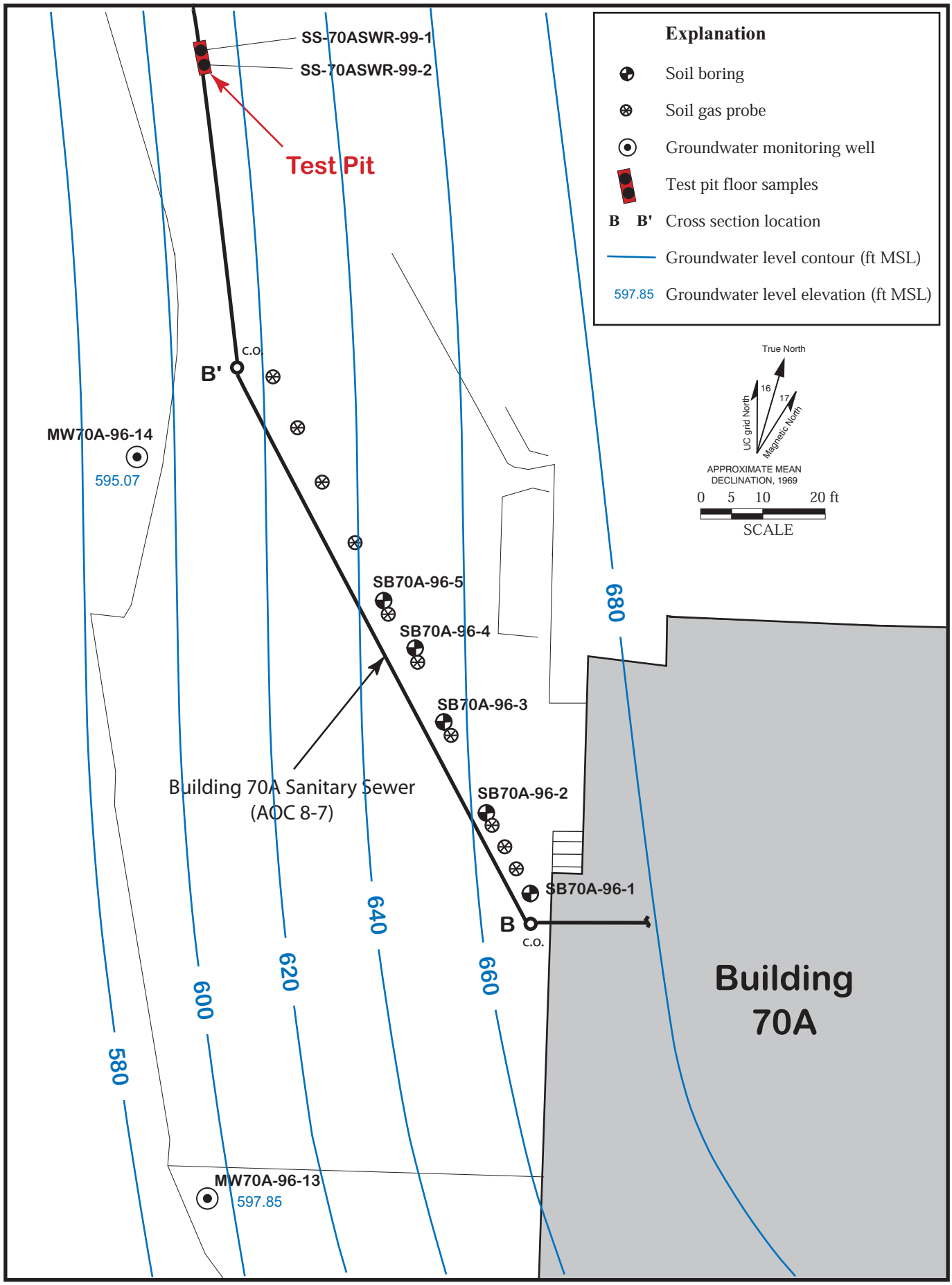

Figure 1. Locations of Test Pit, Soil Borings, Soil Gas Probes, and Monitoring Wells with Water Level Elevation Contours (3rd Quarter FY1999), Building 70A Sanitary Sewer (AOC 8-7).

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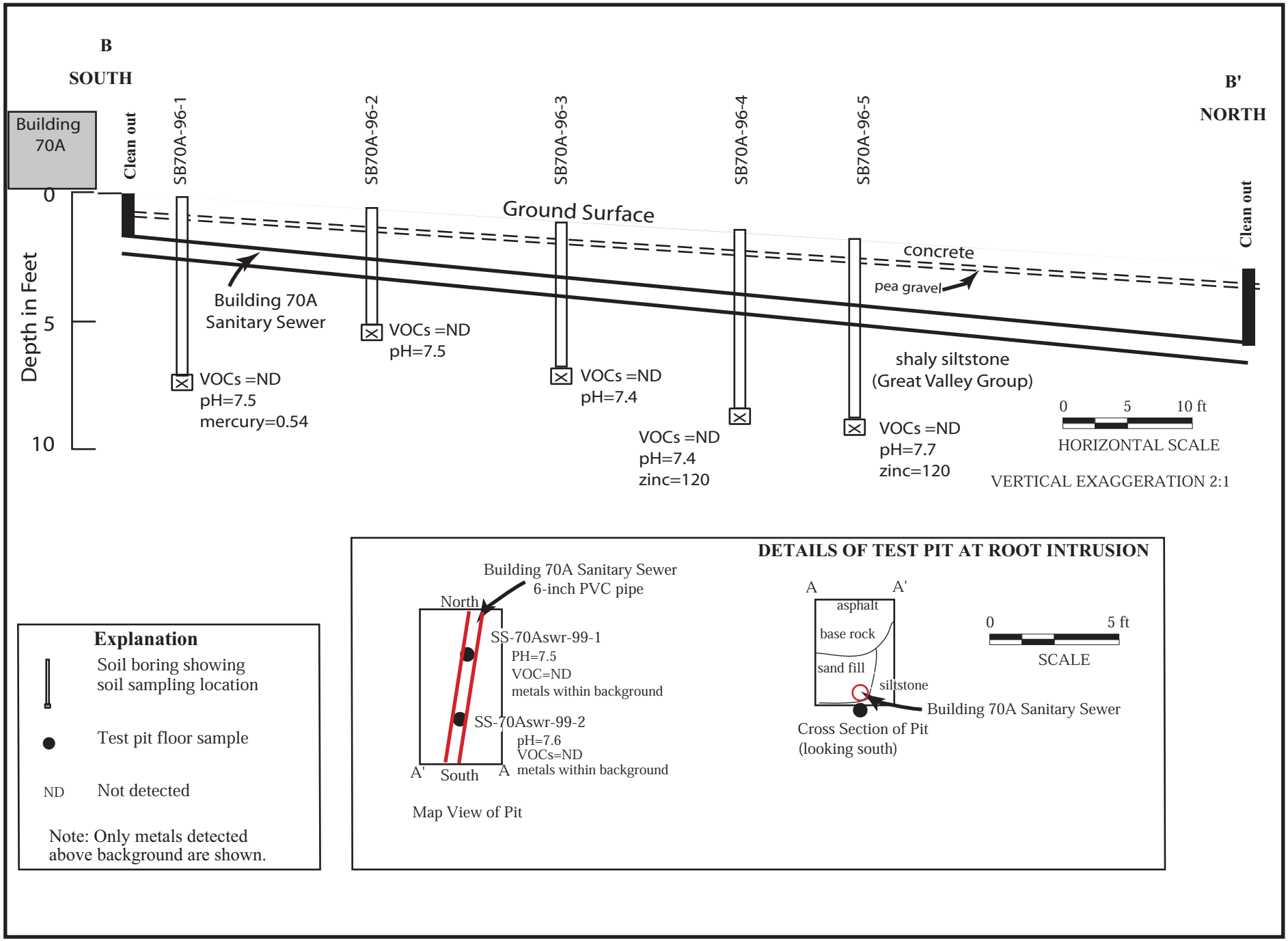

Figure 2. Cross Section Along Building 70A Sanitary Sewer Line (AOC 8-7) and Details of Test Pit Showing Sampling Results

LIST OF TABLES

Table 1.

Soil Sampling Results for VOCs and pH

AOC 8-7: Building 70A Sanitary Sewer System

		Analyte	VOCs	pH
		Method	8260	9040
Boring/Sample	**Date**	**Lab**	**mg/kg**	**S.U.**
SB70A-96-1-7	Oct-96	CLS	ND	7.5
SB70A-96-2-5	Oct-96	CLS	ND	7.5
SB70A-96-3-5.5	Oct-96	CLS	ND	7.4
SB70A-96-4-7	Oct-96	CLS	ND	7.4
SB70A-96-5-7	Oct-96	CLS	ND	7.7
MW70A-96-13-8.2	Sep-96	BC	ND	
MW70A-96-13-18			ND	
MW70A-96-13-48			ND	
MW70A-96-13-68			ND	
MW70A-96-13-78			ND	
MW70A-96-14-10	Sep-96	BC	ND	
MW70A-96-14-20.5			ND	
MW70A-96-14-30			ND	
MW70A-96-14-40			ND	
SS-70ASWR-99-1-4.0	Sep-99	BC	ND	7.51
SS-70ASWR-99-2-3.6	Sep-99	BC	ND	7.62

BC = Analysis by BC Laboratories

CLS= Analysis by California Laboratory Services

ND	= Not detected
	= Not analyzed

Table 2.
Soil Sampling Results for Metals
AOC 8-7: Building 70A Sanitary Sewer System
(Concentrations in mg/kg)

		Sb	As	Ba	Be	Cd	Cr	CrVI	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
Maximum Background Concentrations		5.5	19.1	323.6	1.0	2.7	99.6		22.2	69.4	16.1	0.4	7.4	119.8	5.6	1.8	27.1	74.3	106.1
USEPA Region 9 PRGs		30	0.38	5200	150	37	210	30	3300	2800	400	22	370	1500	370	370	6	520	22000
California Modified PRGs						9		0.2			130			150					
Boring/Sample	**Date**																		
SB70A-96-1-7	Oct-96	<0.9	<1	170	0.94	<1	36	NA	18	48	10	0.54	<4	44	<1	<0.4	<1	52	100
SB70A-96-2-5	Oct-96	<0.9	4.1	120	0.85	<1	26	NA	14	34	13	<0.2	<4	37	<1	<0.4	<1	39	80
SB70A-96-3-5.5	Oct-96	<0.9	2.1	150	0.73	<1	29	NA	16	41	11	<0.2	<4	37	<1	<0.4	<1	43	97
SB70A-96-4-7	Oct-96	<0.9	2.1	130	0.91	<1	36	NA	22	59	12	<0.2	<4	45	<1	<0.4	<1	51	120
SB70A-96-5-7	Oct-96	<0.9	1.7	83	0.84	<1	34	NA	18	60	12	<0.2	<4	48	<1	<0.4	<1	49	120
MW70A-96-13-8.2	Sep-96	<10	14	178	<1	<1	40	NA	15	44	12	<0.2	<5	34	2.4	<2	<10	48	92
MW70A-96-13-18		<10	18	170	<1	<1	33	NA	13	45	14	<0.2	<5	39	2.2	<2	<10	43	103
MW70A-96-13-48		<10	18	32	<1	<1	17	NA	<5	19	<5	<0.2	<5	8.7	1.1	<2	<10	20	42
MW70A-96-13-68		<10	14	138	<1	<1	64	NA	16	61	14	<0.2	<5	67	2.5	<2	<10	59	105
MW70A-96-13-78		<20	12	75	<2	<2	68	NA	15	63	15	<0.2	<10	67	3.4	<4	<20	65	122
MW70A-96-14-10	Sep-96	<10	12	188	<1	<1	43	NA	26	60	14	<0.2	<5	51	3.0	<2	<10	59	127
MW70A-96-14-20.5		<10	9.3	110	<1	<1	40	NA	18	80	13	<0.2	<5	56	2.4	<2	<10	52	142
MW70A-96-14-30		<10	10	179	<1	<1	44	NA	18	44	9.2	<0.2	<5	52	2.6	<2	<10	59	109
MW70A-96-14-40		<10	8.9	137	<1	<1	44	NA	19	49	10	<0.2	<5	57	2.6	<2	<10	53	109
SS-70ASWR-99-1-4.0	Sep-99	<10	10	173	<1	<1	34	NA	13	14	12	<0.2	<5	41	<1	<2	<10	50	88
SS-70ASWR-99-2-3.6		<10	9.5	181	<1	<1	40	NA	14	46	13	<0.2	<5	45	<1	<2	<10	63	90

NA = Not analyzed
<5 = Not detected (reporting limit shown)
25 = Concentration above background but below PRG.

Table 3.

Results of Radionuclides Analyses of Soil Samples

AOC 8-7: Building 70A Sanitary Sewer System

Sample Number	DATE	Gross Alpha	Gross Beta	Gamma
		All results are in units of picocuries per gram (pCi/g)		
SB70A-96-1-7	**Oct 96**	<10	**19 ± 2**	**36 ± 15**
SB70A-96-2-5	**Oct 96**	<10	**15 ± 2**	**30 ± 15**
SB70A-96-3-5.5	**Oct 96**	<10	**14 ± 2**	**27 ± 13**
SB70A-96-4-7	**Oct 96**	<10	**21 ± 2**	**27 ± 13**
SB70A-96-5-7	**Oct 96**	<10	**23 ± 2**	**31 ± 15**
SS-70ASWR-99-1	**Sep 99**	<10	**6 ± 1**	**K-40=5.2 ± 0.7 Th-232=0.5 ± 0.4 U-nat=0.7 ± 0.3**
SS-70ASWR-99-2	**Sep 99**	<10	**9 ± 2**	**K-40=5.4 ± 0.7 Th-232=0.17 ± 0.07 U-nat=0.5 ± 0.3**

Note: All gamma results were reported as naturally-occurring elements

< = not detected (less than method detection amount).

Analyses performed by Lawrence Berkeley Laboratory Analytical Services Group.

Attachment 1

LBNL Response to the April 30, 1999 DTSC Notice of Deficiency, dated May 28, 1999

For AOC 8-7, BLDG. 70A Sanitary Sewer

11. Provide diagrams with dimensions showing exact location of samples taken with respect to suspect pipe and groundwater gradient.

LBNL Response

Scale drawings showing the locations (horizontal and vertical) of samples with respect to the pipe and locations (horizontal) of samples relative to the groundwater gradient will be provided in a revised NFA/NFI request report.

12. Chemicals of potential concern (COPC's) listed do not correspond to all wastes generated by laboratories in Building 70A (semi conductor manufacturing) which should also include metals and cyanides.

LBNL Response

The DTSC RFA states that the Building 70A semi-conductor fabrication laboratories discharged acid wastes into the sanitary sewer until 1985, when an acid neutralization unit was built to treat these wastes. Various waste acids (nitric, hydrofluoric, and hydrochloric) were the only wastes discharged to the Building 70A sanitary sewer identified in the DTSC RFA. The LBNL RFA discusses surveys in 1977 and 1991 of the LBNL sanitary sewer system that were conducted to identify areas of corrosion or breakage. No corroded or damaged segments were identified along the Building 70A sanitary sewer.

Soil samples were collected adjacent to the Building 70A sanitary sewer line during the RFI and analyzed for pH to address possible releases of acid wastes. If a release(s) of acid waste had occurred from the line, low soil pH values would be the defining indicator of a release. Levels of pH measured were neutral to slightly basic. Soil samples were also analyzed for metals, as described in the NFA/NFI request report. Soil samples were not analyzed for cyanide; however, it is unlikely that cyanide would have been disposed in the sanitary sewer with acid waste, since cyanide gas would likely have been produced from the reaction between cyanide and acids. All analytical results are given in the NFA/NFI request report.

Proposed Work

Although no investigations were required for AOC 8-7 in the DTSC RFA or LBNL RFI Work Plan, LBNL will conduct additional investigations to address DTSC concerns. LBNL will use a two-phase approach to further evaluate whether the Building 70A sanitary sewer line has released waste. First, LBNL will conduct a survey of the Building 70A sanitary sewer line to identify any dislocations, breaks, or perforations caused by corrosion. If dislocations, breaks, or perforations are identified by the survey, a workplan will be prepared and submitted to DTSC for additional sampling. If no dislocations, breaks, or perforations are identified, AOC 8-7 will be resubmitted for NFA status.

Attachment 2

Memorandum from LBNL Facilities Department to Iraj Javandel,
Environmental Restoration Program Manager,
dated September 24, 1999

BERKELEY LAB

FACILITIES DEPARTMENT

MEMORANDUM September 24, 1999

To: Iraj Javandel

From: Bob Torres Robert Torres

Subject: Sanitary Sewer Inspection

As per your request, Joe Walling and I inspected the sanitary sewer line west of Building 70A on September 15, 1999, using an R.S. Technical Services Inc. 1200-Series camera. The first section of the line consisted of 90 feet of cast iron pipe. No defects, root intrusion or displacement was observed in this section. The following section of the line consisted of 70 feet of PVC (Schedule 80) pipe. A root intrusion was observed at a joint of this section located about 55 feet from the cast iron / PVC connection cleanout. All of our observation were recorded on a video tape submitted to you. Please contact Joe Walling (Berkeley Lab Utility Coordinator) at 486-4842 for additional information if needed.

Attachment 3

Photograph #1: Position of the Test Pit Relative to Building 70A.

Photograph #2: Location of Root Intrusion at the Top of the Sanitary Sewer Line.

Photograph #1: Position of the Test Pit Relative to Building 70A.

Photograph #2: Location of Root Intrusion at the Top of the Sanitary Sewer Line.